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Are we following guidelines in inguinal hernia repair? An evaluation of practice patterns in the abdominal core health quality collaborative

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Abstract

Aim: The HerniaSurge Group established inguinal hernia repair guidelines to reduce recurrence and chronic pain. We evaluated whether the surgeons of the Abdominal Core Health Quality Collaborative (ACHQC) follow these guidelines and identify areas for improvement.

Methods: A retrospective evaluation of data from the ACHQC database between 2013-2021 using 18,641 eligible subjects undergoing elective and emergent hernia repair with 30-day follow-up. Compliance with a given guideline was defined as following the recommendation in 70% of cases.

Results: Twelve of 19 questions with available data met recommendations based on our above criteria. Eight recommendations with strong evidence and four recommendations with weak evidence were met. The recommendations not met were using the Shouldice technique for any non-mesh open inguinal herniorrhaphy, using local anesthesia for open repair of reducible inguinal hernias, using lightweight mesh, and avoiding the use of prophylactic antibiotics in laparoscopic herniorrhaphy.

Conclusion: Despite varied techniques for inguinal hernia repair, surgeons of the ACHQC follow the majority of the recently published guidelines on the subject. While further research is needed to strengthen the existing guidelines, a standardized approach will facilitate this effort while aiming to reduce negative patient outcomes.

Keywords: Inguinal, hernia, guidelines, hernia repair, ACHQC

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INTRODUCTION

Inguinal hernias are the most common types of hernias occurring worldwide, with an annual incidence of 223 million, of which approximately 20 million get repaired[1]. Options to date include laparoscopic *vs.* open approaches. Traditional primary tissue repairs such as the Bassini, McVay, and Shouldice techniques have been employed[2]. The Bassini repair entails suturing the conjoined tendon to the inguinal ligament from the pubic tubercle medially to the area of the internal ring laterally, whereas the McVay repair is the only primary tissue repair technique that may be used for inguinal or femoral hernias and involves suturing the conjoined tendon to Cooper's ligament with the last stitch capturing the inguinal ligament and includes a relaxing incision in the rectus sheath due to the high tension of the repair. The Shouldice repair is a four-layer bi-directional closure, with the first two layers reapproximating the conjoined tendon with the transversalis fascia and the transversalis fascia with the inguinal ligament in opposing runs of continuous suture starting from medial to lateral, and the second two layers reapproximating the internal oblique with the inguinal ligament, followed by reapproximation of the external aponeurosis and reconstruction of the external inguinal ring again in opposing runs of continuous suture from lateral to medial[3]. The recurrence rate for the Bassini and McVay techniques ranges from 10%-30%, while the Shouldice repair has a much lower rate of 4.8%[4]. These techniques were improved by the Lichtenstein technique, which performed an open repair in a tension-free fashion by incorporating mesh and significantly reduced recurrence rates. However, the criticism associated with the use of mesh in inguinal hernia repair is chronic pain, which occurs in 11% of cases[5]. Mesh is also inherent to laparoscopic hernia repair, but the incidence of chronic groin pain is less with this approach. The re-operative recurrence rates between tension-free Lichtenstein repair (2.4%) and laparoscopic repair (3.3%) are comparable[4].

The HerniaSurge Group, an international collaboration of surgeons, established guidelines for inguinal hernia repair based on a systematic literature search with the goal of reducing recurrence and chronic pain[6]. Nationally, the Abdominal Core Health Quality Collaborative (ACHQC) was established as a non-profit comprised of 440 institutional and individual surgeon members who voluntarily report patient data that are then aggregated, de-identified, and shared within a national database, with a focus on quality improvement[7]. Members are those who are engaged in abdominal core and hernia surgical repair, while the patients they plan to operate on are prospectively registered, and data collection continues throughout the peri-operative and post-operative timeline. The pertinent operations for this database include inguinal and ventral hernias. In addition to patient demographics, surgical data, and any complications, the collected information also includes but is not limited to long-term follow and patient-reported data. Data entry is not compulsory but rather encouraged, and active member status is predicated on continued data entry. Therefore, we accessed this database to evaluate the degree of ACHQC surgeon compliance with the hernia guidelines and identify potential areas for improvement. Recognizing and addressing the areas of improvement will be central in working toward a standardized surgical approach to inguinal hernia repair and thus facilitating future research on minimizing hernia recurrences, chronic pain, and associated costs.

METHODS

Data obtained from the ACHQC between the years 2013 - 2021 were retrospectively reviewed. The population consisted of 18,641 male and female eligible subjects with inguinal and femoral hernias undergoing elective and emergent hernia repair with 30-day follow-up. Data points were displayed as numerical values and percentages and were selected and correlated with key questions addressed in the *International Guidelines for Groin Hernia Management* published by the HerniaSurge Group in 2018. While 28 questions were posed within the publication, 23 focused on management, of which 19 were able to be assessed for compliance based on ACHQC available data, including use of prophylactic antibiotics, same-day surgery, open *vs.* laparoscopic repair, total extraperitoneal (TEP) *vs.* transabdominal pre-peritoneal

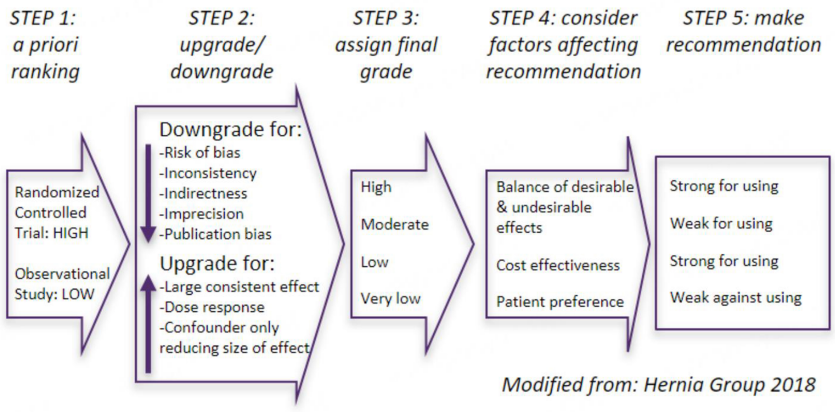

Figure 1. A visual schematic modified from Hernia Group 2018 depicting the process by which the newest inguinal hernia guidelines were established.

(TAPP) laparoscopic hernia repair, flat mesh *vs.* plug and patch in open hernia repair, type of anesthesia, type of mesh selection, operative approach for femoral hernias, and nerve recognition *vs.* prophylactic neurectomy. Within the above publication, the questions were answered with recommendations that were assigned a strength based on the quality of evidence encountered during the literature search [Figure 1] Compliance with a given guideline was defined as following the recommendation in 70% of cases.

RESULTS

The majority of the subjects include males between the ages of 31 and 65 with primary unilateral hernias [Table 1]. Based on our analysis, 19 of the recommendations were able to be evaluated from the available ACHQC data. Of these, 12 questions met recommendations, and seven did not [Tables 2 and 3]. The eight recommendations met with strong evidence were (1) use of mesh for large direct hernias during laparoscopic repair to decrease recurrence (100%); (2) deferring choice of TEP or TAPP laparoscopic repair to surgeon preference and experience due to comparable outcomes (99%); (3) nerve awareness and recognition to avoid chronic pain (96%); (4) same day elective surgery if appropriate follow-up can be arranged (92%); (5) mesh-based repair in both open and laparoscopic approaches (89%); (6) laparoscopic approach for bilateral hernia repair (89%); (7) laparoscopic approach for femoral hernia repair (78%); and (8) flat mesh over plug and patch/3D bilayer when used for open repair (70%).

The four recommendations with weak evidence that were met included (1) optional round ligament division during TEP/TAPP (96%); (2) limiting pre-peritoneal mesh as opposed to Lichtenstein repair to research settings (87%); (3) using general or local over regional anesthesia in patients over the age of 65 due to higher associated incidence of medical complications, such as myocardial infarction, pneumonia, and venous thromboembolism (84%); and (4) using mesh in emergent hernia repair (82%).

Four recommendations with strong evidence not met were that (1) women with groin hernias undergo laparoscopic repair with mesh (57%); (2) the Shouldice technique be used in non-mesh inguinal hernia repair (52%); (3) local anesthesia be used for open repair of reducible inguinal hernias; and (4) prophylactic antibiotics be avoided in laparoscopic hernia repair (5%).

Three recommendations with weak evidence not met were the laparoscopic approach for unilateral inguinal hernia repair in male patients due to lower incidence of post-operative and chronic pain (59%), avoiding prophylactic partial or complete neurectomy in an attempt to prevent chronic pain (50%), and using lightweight over the heavyweight mesh.

Table 1. Patient demographics

Hernia type	Unilateral (*n* = 14,179)		Bilateral (*n* = 4,426)	
Age				
≤ 30 years	770	5%	177	4%
31-65 years	7,605	54%	2,689	61%
> 65 years	5,804	41%	1,560	35%
Sex				
Male	12,805	90%	4,137	93%
Female	1,374	10%	325	7%
Hernia incidence at time of repair				
Primary	12,818	90%	3,947	89%
Recurrent	1,361	10%	515	12%

Table 2. ACHQC compliance with strong recommendations for surgical management of inguinal hernias

Surgical Treatment Recommendations of Inguinal Hernias: (STRONG)	% Compliance
Prophylactic antibiotics in open herniorrhaphy only in high-risk environment	N/A
Surgeons should offer anterior and posterior repair options	N/A
Mesh for large direct hernias during TAP/TEPP to decrease recurrence	100
Surgeon choice on TEP *vs.* TAPP due to comparable outcomes	99
Nerve awareness and recognition during herniorrhaphy to avoid chronic pain	96
Same day elective surgery if timely follow up is organized	92
Mesh-based repair	89
Laparoscopic approach for bilateral herniorrhaphy	89
Femoral hernias to be repaired laparoscopically with mesh	78
Flat mesh over plug & patch or 3D bilayer	70
Women with groin hernias to undergo laparoscopic repair with mesh	57
Shouldice technique in non-mesh inguinal herniorrhaphy	52
Avoid mesh selection solely based on terms "lightweight" and "heavyweight", as weight limits are not clearly defined	50
Local anesthesia for open repair of reducible inguinal hernias	25
Avoid prophylactic antibiotics in laparoscopic herniorrhaphy	5

ACHQC: Abdominal Core Health Quality Collaborative; TAP: total extraperitoneal; TAPP: transabdominal pre-peritoneal; TEP: total extraperitoneal; TEPP: transabdominal preperitoneal.

Table 3. ACHQC compliance with weak recommendations for surgical management of inguinal hernias

Surgical Treatment Recommendations for Inguinal Hernias: (WEAK)	% Compliance
Atraumatic (glue) mesh fixation in open herniorrhaphy to reduce pain	N/A
Avoid routine bladder catheterization during herniorrhaphy	N/A
Round ligament division optional during TAPP/TEP	96
Pre-peritoneal mesh (*vs.* Lichtenstein repair) limited to research settings	87
General or local over regional anesthesia in patients > 65 yo	84
Mesh use in clean emergent herniorrhaphy	82
Laparoscopic approach for unilateral herniorrhaphy in male patients due to lower incidence of postop and chronic pain	59
Avoid prophylactic partial or complete neurectomy	50

ACHQC: Abdominal Core Health Quality Collaborative; TAPP: transabdominal pre-peritoneal; TEP: total extraperitoneal.

DISCUSSION

Inguinal hernia repair is a common procedure that, in the elective setting, has ample potential for a standardized approach. The development of the European Hernia Society guidelines in 2009[8] and the recent 2018 update[6] offers an evidence-based platform for this goal. Previous literature indicated that most surgeons participating in the ACHQC adhere to recent guidelines for ventral and epigastric hernia repair[9]. To date, this same analysis regarding inguinal hernia repair has not been examined. In this retrospective study, we found that despite a variety of factors that determine clinical decision-making in inguinal hernia repair, most surgeons that participate in the ACHQC also adhere to most guidelines for inguinal hernia repair.

Of the guidelines not met by the threshold set in this study, more than 50% of surgeons still followed the published recommendations in all the categories except using local anesthesia for open repair of reducible inguinal hernias and avoiding prophylactic antibiotics in laparoscopic hernia repair. The former recommendation is based on the knowledge and confidence of surgeons in performing field blocks, which could understandably account for the underutilization of this technique during open inguinal hernia repair and failure to meet this guideline.

The recommendation to avoid antibiotics in elective laparoscopic inguinal hernia repair is specific to an "average risk" population, grossly defined within the guidelines as any individual with a "primary hernia and minimal medical or operative risk factors"[10]. The obvious challenge for any surgeon is appropriately categorizing the patient as an "average risk" without more specific criteria. Moreover, the current SCIP guidelines recommend prophylactic antibiotic administration one hour prior to surgical incision. Disseminated by the Centers for Medicare and Medicaid, these guidelines are widely known by surgeons nationally and followed as the current standard of care. The Surgical Care Improvement Project (SCIP) guidelines do not, however, specifically delineate the recommendations for prophylactic antibiotics within laparoscopic surgery, and it was not until the meta-analysis conducted in the publication of the 2018 Inguinal Hernia Guidelines that the difference in surgical site infection was found to be negligible specifically in low to average risk patients undergoing elective laparoscopic inguinal hernia repair.

This study highlights the utility of the ACHQC in examining quality metrics in hernia surgery. Areas for future research include identifying and combating healthcare disparities with regard to hernia care. It has been well documented that there are healthcare disparities among minority and rural patients with regard to cancer care and surgeon compliance with guideline-based therapy[11,12].

The retrospective nature of this study presents several inherent limitations, including reporting bias. To gain access to ACHQC data, surgeons must contribute patient outcomes to the database[7]. Due to the effort and resources required to input this data, it would seem likely that most surgeons in the ACHQC practice in an academic or teaching setting and are more likely to follow the latest guidelines due to a heightened awareness of existing practice patterns. With the volume of inguinal hernia repairs performed annually, it is imperative that community general surgeons also be made aware of and adhere to current guidelines.

In addition, our data examined patients as early as 2013, and practice patterns are known to change over time. With many of the recommendations favoring a laparoscopic approach, ongoing research should be performed as laparoscopy continues to become a standard component of resident training and physician practice. As surgeons become more comfortable with laparoscopy and robotic surgery, it should be re-examined whether adherence to laparoscopy-specific guidelines improves.

Although various techniques exist for inguinal hernia repair, the practices of surgeons captured in the ACHQC mostly conform to recently published guidelines. However, there are still guidelines that lack surgeon compliance. Although the present study suggests that the hernia community is successful in adhering to data-driven practices, there is still room for improvement, self-assessment, and self-criticism. The ongoing research conducted by the HerniaSurge Group represents a necessary investigation into the best practices within the continually evolving field of hernia surgery. The ACHQC is a valuable resource for data and accountability to both establish sound guidelines and monitor adherence. While further research is needed to strengthen the existing guidelines, a standardized approach will facilitate this effort while aiming to reduce negative patient outcomes.

DECLARATIONS

Authors' contributions

Conceived the presented idea, sought out data acquisition, and supervised the findings of this work: Hope W

Performed the computation, composed the Tables and Figures, wrote the manuscript: Oyola AM

Contributed to discussion and editing: Beeson S

Provided critical feedback and assistance with editing: Hope W, Edgerton C

Availability of data and materials

Data from 18,641 eligible subjects with inguinal and femoral hernias were evaluated. Inclusion criteria consisted of elective and emergent cases with 30-day follow-up. The relevant data were selected based on questions and recommendations posed in the 2018 HerniaSurge Group publication: *International Guidelines for Groin Hernia Management*.

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Not applicable.

Conflict of interest

All authors declared that there are no conflicts of interest.

Ethical approval and consent to participate

Data obtained from the ACHQC between the years 2013-2021. The Abdominal Core Health Quality Collaborative (ACHQC) was established as a non-profit comprised of 440 institutional and individual surgeon members who voluntarily report patient data that are then aggregated, de-identified, and shared within a national database.

Consent for publication

Not applicable.

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